CHAIR WITH FUNCTIONAL ARMREST

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to armrests for seating units such as office chairs and the like.

Description of the Related Art

[0002] Seating units such as office chairs may include armrests to support the forearms of a seated user. Such armrests are often padded, and may include various positional adjustment features to accommodate the needs of a particular user. Such adjustment features may include height adjustment, side-to-side adjustment, and/or front to rear adjustment. Such adjustment may require that a user manipulate a release lever or the like to unlock the adjustment mechanism to permit movement of the armrest.

[0003] Also, in use, the armrest may contact the edge of a desk or the like, potentially resulting in damage to the armrest. Such contact may also limit the movement of the chair itself and limit the ability of the user to get as close to the desk as desired. U.S. Patent No. 5,931,537 does disclose an adjustable armrest assembly including detent arrangement wherein an armrest will move from a normal use position to a retracted position when the chair is moved such as when the armrest engages a desk. However, known adjustment mechanisms may be somewhat awkward or difficult to use, and may not permit a user to quickly and easily lock the armrest in the desired position.

SUMMARY OF THE INVENTION

[0004] One aspect of the present invention is an adjustable armrest for a chair including a base and a support member slidably coupled to the base for movement in first and second directions between first and second positions relative to the base, wherein the support member is biased into the first position. The armrest includes a device selectively retaining the support member in the second position, and the device includes a catch and a removable retaining member that is engagable with the catch to retain the support member in the second position. The retaining

member disengages from the catch upon movement of the support member to permit movement of the support member relative to the base.

[0005] Another aspect of the present invention is a seating unit including a frame, a seat, and a pair of armrests movably mounted to the frame for movement between forward and rearward positions. The armrests are biased into the forward position, and each armrest includes a device selectively retaining the armrest in the rearward position. Movement of the armrest releases the device such that the armrest moves to the forward position due to the bias.

[0006] Yet another aspect of the present invention is a seating unit including a frame, a seat, a backrest, and a pair of armrests movably mounted to the frame for movement between forward and rearward positions. The armrests are biased into the forward position, and a heart and pawl device operably interconnects the armrest with the frame. The heart and pawl device selectively retains the armrest in the rearward position, and biases the armrest towards the forward position.

[0007] These and other features, advantages, and objects of the present invention will be further understood and appreciated by those skilled in the art by reference to the following specification, claims, and appended drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] Fig. 1 is a perspective view of a seating unit according to one aspect of the present invention;

[0009] Fig. 2 is an exploded perspective view of an armrest according to another aspect of the present invention;

[0010] Fig. 2A is an enlarged view of the heart-shaped portion of the track in the slide block of Fig. 2;

[0011] Fig. 3 is a fragmentary side elevational view of an armrest according to another aspect of the present invention;

[0012] Fig. 4 is an end view of the armrest of Fig. 3;

[0013] Fig. 5 is an exploded perspective view of an armrest having the heart and pawl mechanism of Figs. 6 and 6A;

[0014] Fig. 5A is an exploded perspective view showing the heart and pawl mechanism of the armrest of Fig. 5 from another perspective;

[0015] Fig. 6 is a plan view of a heart and pawl mechanism according to one aspect of the present invention, wherein the armrest is in the forward position;

[0016] Fig. 6A shows the armrest of Fig. 6 wherein the armrest is held in the rear position by the heart and pawl mechanism;

[0017] Fig. 6B is a schematic drawing of an armrest having side-to-side adjustment according to another aspect of the present invention;

[0018] Fig. 6C is a schematic drawing of an armrest having rotational adjustment according to another aspect of the present invention;

[0019] Fig. 6D is a schematic drawing of an armrest having height adjustment according to another aspect of the present invention;

[0020] Fig. 7 is an exploded perspective view of an armrest according to yet another aspect of the present invention, wherein the armrest includes an angular adjustment mechanism;

[0021] Fig. 7A is an enlarged view of another version of the angular adjustment mechanism of Fig. 7; and

[0022] Fig. 8 is an exploded perspective view of the armrest of Fig. 7 from another perspective.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

[0023] For purposes of description herein, the terms "upper," "lower," "right," "left," "rear," "front," "vertical," "horizontal," and derivatives thereof shall relate to the invention as oriented in Fig. 1. However, it is to be understood that the invention may assume various alternative orientations and step sequences, except where expressly specified to the contrary. It is also to be understood that the specific devices and processes illustrated in the attached drawings and described in the following specification are simply exemplary embodiments of the inventive concepts defined in the appended claims. Hence, specific dimensions and other physical characteristics relating to the embodiments disclosed herein are not to be considered as limiting, unless the claims expressly state otherwise.

[0024] With reference to Fig. 1, a seating unit such as a chair 1 for offices and the like includes a frame 2, a chair base 3 for supporting the chair on a floor surface, a seat 4, and a backrest 5. The armrests 6 are connected to the frame by support members 7, and may be moved forwardly and rearwardly as indicated by the arrow "A".

[0025] With further reference to Fig. 2, each armrest assembly 6 may include a support member 10 having a padded cushion 11 for supporting the forearm of a seated user. An armrest base member such as slide block 12 is secured to the armrest support member 7 by screws 13, and is slidably received in a guide member 14. The slide block 12 may be made of a relatively strong material, such as aluminum, and the guide member 14 may be made of a low-friction polymer or other suitable material. The guide member 14 is generally C-shaped in cross section, and slide block 12 includes raised pads 15 at each corner having cylindrical surface portions that slidably engage the curved inner surface 16 of guide member 14. A pin 17 extends through a keyhole shaped opening 18 in guide member 14, and into a slot or track 19 formed in slide block 12 to form what is sometimes referred to as a "push-push mechanism". A push-push mechanism is a device that secures a useful component at one end of a stroke when pushed and released a first time, but then releases the component when pushed in the same direction and released a second time.

[0026] There are different ways to construct a push-push mechanism. As illustrated, the track 19 includes an elongated linear portion 20, and a heart-shaped end portion 21. When assembled, the guide member 14 is positioned between tabs 22 and horizontal web 23 of support member 10. Support member 10 is made of a sheet metal material, and tabs 22 are formed by making U-shaped cuts in vertical side web 10A of support member 10. Tabs 22 are then bent inwardly to form openings 22A. A downwardly extending tab 24 of support member 10 extends through opening 25, and provides a stop for a spring 26. Tab 24 is formed in a similar manner to tabs 22, and forms an opening 24A after tab 24 is bent downwardly. When assembled, spring 26 is positioned within channel 27 of slide block 12, with a first end 28 of spring 26 contacting an end 30 of channel 27, and a second end 29 of spring 26 contacts tab 24 of support member 10. Spring 26 is in compression to thereby bias the support member 10 in the forward direction as indicated by the arrow "F". When assembled, the lower end 31 of pin 17 is received in track 19, and shoulder 32 of pin 17 is sandwiched between the upper web 33 of guide member 14 and the upper surface 34 of slide block 12. Upper end 35 of pin 17 is slidably received in the elongated opening 18 in guide member 14. In use, when the support member 10 is in the forward position, the pin 17 will engage the elongated portion 20 of track

19. As the support member 10 is pushed rearwardly in the direction of the arrow "R" the pin 17 will travel along track 19 until it encounters the heart-shaped portion 21.

[0027] With further reference to Fig. 2A, as the end portion 31 of pin 17 travels along the track 19 in the direction of the arrow "B", it will encounter an angled portion or lobe 36 of track 19, and contact angled sidewall 37. Pin 17 will eventually also contact sidewall portion 38, thereby preventing further rearward motion of support member 10. If the force on support member 10 is then released, the spring 26 will begin to shift the support member 10 in the forward direction, causing the end 31 of pin 17 to engage notch or corner 39, thereby retaining the support member 10 in the rearward position. If a user then applies another rearward force to the support member 10, the pin 31 will then travel in the direction indicated by the arrow "D" until it contacts sidewall 40. If the force is then released, the pin 17 will travel as indicated by the arrows E and F and return to the elongated portion 20 of track 19, and the spring 26 will push the support member 10 back to the forward position. The pin 17 may be biased by a spring or the like (not shown) in the direction of the arrow "G" to ensure that the pin 17 shifts into engagement with notch 39 when the force on the support member 10 is released immediately after the support 10 is pushed to the rearward most position wherein end 31 of pin 17 contacts sidewalls portions 37 and 38.

[0028] With reference to Figs. 3 and 4, an armrest 50 according to another aspect of the present invention includes a support member 51 that is similar to the support member 7 described above for connecting the armrest 50 to a seating unit such as the office chair 1 of Fig. 1 described in detail above. A padded cushion 52 is secured to a structural member 53. The structural member 53 has a shallow C-shape in cross section with a web 54, sidewalls 55, and lips 56 forming channels 57 that slidably receive extensions 58 of a slide block 59 that is secured to the support member 51. A "heart and pawl" device 60 includes a rod 61 that is pivotably connected to a clevis 62 on structural member 53. Pins 63 interconnect an opposite end 64 of heart and pawl device 60 to the slide block 59. Heart and pawl device 60 is a commercially available prior art unit that is available from Lord Corporation, and includes an internal heart and pawl mechanism (not shown) and an internal spring (also not shown) biasing the rod 61 outwardly from the cylindrical section 65 of device 60 to thereby bias the structural member 53 and cushion 52 in the direction of the arrow "F". In use, if a force is applied to

the cushion 52 in the direction of the arrow "R", the cushion will slide rearwardly to the rearward position designated 66, and the heart and pawl device 60 will latch to retain the cushion 52 and structural member 53 in the rearward position 66. If a force is again applied in the direction of the arrow R, the heart and pawl device 60 will release, and the bias of rod 61 will push the cushion 52 and structural member 53 in the direction of the arrow "F" until it reaches the forward most position wherein the heart and pawl device 60 is fully extended.

[0029] With further reference to Figs. 5 and 5A, an armrest 70 according to another aspect of the present invention includes a support structure 71 for connecting to a chair frame. Support structure 71 includes a square boss 72 extending from an upper end 73 of the support structure. The square boss 72 is slidably received in an elongated slot 75 in a slide member 74. When assembled, a fastener 76 extends through an opening 77 in a detent member 78 and into a threaded opening 79 on boss 72. Retainer member 78 includes a cylindrical lower extension 80 that is received in an opening 81 in block 82. When assembled, a padded cushion 83 is secured to the slide member 74, and the block 82 is positioned within channel 84 of slide member 74. An elongated flexible wire 85 has a curved end portion 86 that is rigidly fixed to the slide member 74 via a threaded fastener 87 and washer 88 that are received in a threaded opening 89. Wire 85 includes a transversely (upwardly) extending end portion 90 that is received in track 91 of block 82. Spring 92 includes a first end 93 that interconnects to a connector 94 on block 82 (see also Figs. 6 and 6A). When assembled, spring 92 is positioned within channel 95 of block 82, and a second end 96 of spring 92 is connected to a connector 97 on slide member 74. The spring 92 is tensioned to bias the slide member 74 and padded cushion 83 in the forward direction indicated by the arrow "F".

[0030] With reference to Figs. 6 and 6A, end 90 of wire 85 is received in track 91 of block 82 to form a heart and pawl device. In use, if a force is applied to the slide member 74 in the direction of the arrow R to move the armrest in the rearward direction, the end 90 of wire 85 will initially travel along the straight portion 98 of track 91 from the forward most position illustrated in Fig. 6. End 90 eventually contacts the heart-shaped raised portion 99, and travels along track section 100 until it contacts the corner 101. If the force on the slide member 74 is then released, the end 90 will contact extension 102 and member 74 will shift forward slightly in the direction of the arrow F, until the end 90 is positioned in corner 103 as illustrated in

Fig. 6A. Because the spring 92 biases member 74 in the direction of the arrow F, the end 90 is thereby retained in corner 103, and the slide member 74 and cushion 83 are retained in the rearward position of Fig. 6A. If a force is then applied to the slide member 74 in the direction of the arrow R when in the position illustrated in Fig. 6A, the end 90 of wire 85 will again contact extension 102, and shift into the U-shaped portion of the track 104 until it contacts corner 105. If the force acting on slide member 74 is then released, slide member 74 will then slide forward in the direction of the arrow F, and end 90 of wire 85 will travel through the track portion 106 and through straight portion 98 of track 91 due to the bias of spring 92 until slide member 74 returns to the forward most position illustrated in Fig. 6.

[0031] In addition to the fore and aft adjustment of the armrest described above, it is contemplated that the present invention of a push-push mechanism can be used on a variety of different armrests and in a variety of different furniture applications. For example, an armrest including the present push-push mechanism may also include the adjustment features illustrated schematically in Figs. 6B, 6C and 6D. More specifically, the armrest 6 may be movable side-to-side relative to the support 7 as indicated by the arrow "S"; Fig. 6B. For example, the side-to-side adjustment mechanism may be a mechanism as illustrated in U.S. Patent Nos. 5,971,484 or 5,439,267, the entire contents of each of which are hereby incorporated by reference. Also, armrest 6 could rotate about a vertical axis 108 relative to support 7 as indicated by the arrow "Z"; Fig. 6C. The mechanism for providing such rotation may be a mechanism as disclosed in U.S. Patent No. 5,971,484, the entire contents of which are hereby incorporated by reference. Also, armrest 6 may be vertically adjustable relative to support 7 as illustrated by the arrow "V"; Fig. 6D. The mechanism for providing vertical adjustment may be the mechanism of the aforementioned U.S. Patent No. 5,971,484. It will be readily understood that an armrest according to the present invention could have all of the adjustment features illustrated in Figs. 6B, 6C, 6D or any combination thereof. Alternately, the armrest could only have the fore-to-aft heart and pawl movement described in more detail above.

[0032] With further reference to Figs. 7, 7A and 8, an armrest 110 according to yet another aspect of the present invention includes a block 82, slide member 74, wire 85 and spring 92 that are substantially the same as discussed in more detail above in connection with Figs. 5-6A. Because this heart and pawl mechanism was described in detail above, it will not be further

discussed in connection with the armrest of Figs. 7, 7A and 8. The armrest 110 includes a height adjustment mechanism 111 that telescopically interconnects lower member 112 to upper member 113. Mechanism 111 may be of the type discussed above in connection with Fig. 6D that is operated (released) by button 130.

[0033] The armrest 110 also includes rotational adjustment provided by detent member 78 and block 82. As illustrated in Fig. 8, detent members 135 are received in channels 137 of detent member 78, and are biased outwardly by springs 136. Cylindrical extension 80 of detent member 78 is rotatably received in opening 81 in block 82. Square opening 138 in detent member 78 engages square boss 139 of plate 114, such that detent member 78 does not rotate relative to the base 112. When assembled, detent members 135 are biased into engagement with notches 141 formed in arcuate detent sidewalls 140 of block 82. Rotation of the slide member 74 and cushion 83 about a vertical axis causes block 82 to rotate because it is positioned within channel 84 of slide member 74. As the block 82 rotates, the detent members 135 slide along the detent sidewall 140 and engage the notches 141 to retain the block 82 at a selected angular position.

[0034] Fig. 7A illustrates another version of the rotational adjustment mechanism. The mechanism of Fig. 7A includes smooth sidewalls 140A, but includes detents 141A in the surface 82A of block 82. Detent members are received in vertical channels (not shown) in detent member 78, and are biased downwardly by springs 136A to thereby provide rotational adjustment including detents to retain the armrest at a selected angular position.

[0035] In addition to the rotational detent devices just described, the rotational adjustment may include smooth detent walls 140A in combination with the detent members 135 of Fig. 8 to thereby provide continuous rotational adjustment, without detents. If this arrangement is utilized, detent members 135 may be made of a relatively high friction material to engage the sidewall 14A and thereby retain the armrest in the selected angular position.

[0036] In the foregoing description, it will be readily appreciated by those skilled in the art that modifications may be made to the invention without departing from the concepts disclosed herein. Such modifications are to be considered as included in the following claims, unless these claims by their language expressly state otherwise.